THE
VETERINARY JOURNAL

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THE subject of our frontispiece needs no introduction to the profession, as few practitioners are better known, and his selection to the honour of the Presidentship of the Council of the Royal College was not only unanimous, but a most popular one. Graduating from the London College in 1882, with the first Fitzwygram amongst a large number of other prizes, Mr. Harry Sumner settled down to practice in Liverpool, where his reputation for sound judgment soon made him a very busy man, not only with a private *clientèle*, but also as a consultant amongst his neighbouring professional friends. He was elected to Council honours in 1906, and in the following year became a Vice-President.

His policy has always been a progressive one for the profession, supporting particularly anything which appeared likely to be for the social or professional advancement of the practitioner ; and it was largely owing to his personal influence that an opportunity was made for a closer association between University teaching and Veterinary science, the University of Liverpool being amongst the first in Great Britain to put into practice the principle that in purely scientific subjects (such as chemistry, physics, botany, and zoology) the foundation of human and veterinary medicine lies on common ground, and the classes of each may be taught together.

Until recently Mr. Sumner held the post of Lecturer in Veterinary and Clinical Surgery at the Liverpool College, freely placing his private *clientèle* and large Infirmary practice at the disposal of the students ; this privilege being much appreciated and made use of.

At the recent and well attended meeting of the National Veterinary Association at Bath he was unanimously elected President, and the profession will wish him all health and strength to fulfil the arduous duties of a double presidential year.

Editorial.

INADEQUATE SALARIES.

Vis Unita Fortior.

OUR contemporary, the *British Medical Journal*, the official organ of the British Medical Association, refers in a scathing Editorial, under the heading of the motto of our profession, to the "miserable salary of £200 a year offered by the Ministry of Agriculture," and to the "still more astonishing fact that it is accepted by members of a learned profession"; and states that, referring again to our motto, "we may venture to express the hope that the members of the veterinary profession will act up to it, and we wish the Veterinary Association and the VETERINARY JOURNAL success in their efforts." The effort referred to is one which is being made to get the younger graduates, in their own interests, to support the effort of the Salaries Committee of the National Veterinary Association to obtain for them a living wage from the commencement of their careers. £200 a year, even with a bonus (which may be taken away at any time), is an absolutely unfair and inadequate sum to offer for a whole-time professional and highly trained man, especially with such comparatively poor prospects ahead, but as long as our younger graduates swallow the bait, so long will this be the bait offered.

The Army authorities arranged things differently when salaries were inadequate and unfair in the Veterinary Corps, with the result that matters were speedily adjusted. The Service was boycotted, the class of man who applied was stated to be below the standard required, and those who had the selection of the candidates did as they were fully entitled to do, *i.e.*, they refused to take inferior material. The profession, with the College Council, stood beside them, and it is now the opportunity for similar measures to be taken to bring into line a Government position which ought to be one of the plums of the profession, and thus command a competition of the best and most capable brains.

With the proved value of the veterinary profession still fresh in the public memory, and the danger of fresh outbreaks of Foot-and-mouth disease still hanging over us, there never was a better opportunity for raising the point, and it will rest between those in authority who have the power to assist their less fortunate brethren, and also with our younger graduates themselves, to settle the question as to whether the recent advertisement (asking for fully qualified men in the prime of life to give up their whole time for the inadequate commencement of £200 a year salary) will command an adequate response from, what ought to be. the best brains the veterinary profession can offer,

Similarly, just now the salaries of the officials in the Indian Civil Veterinary Department need urgent revision, and this is best expressed by the following extracts from a letter recently received from a highly placed official in the Government service, which we quote in order that it may serve to warn the intending graduate who may be tempted to try the Indian service under present conditions. This official writes :—

"I wish to place before the British veterinary profession, through the medium of your Journal, the very unsatisfactory position in which British officers of the Indian Civil Veterinary Department are placed.

"The rates of pay of the service were revised in the early part of 1920, when the Government of India had announced that the value of the rupee was to be maintained at two shillings. The revised rates were, on the basis of two shillings per rupee, fairly satisfactory, although by no means erring on the side of generosity. Since 1920 the Government have found it impossible to maintain the rate they had announced and, at present the value of the rupee is only one shilling and threepence-halfpenny and on this basis the rates of pay are totally inadequate.

"The result is that all officers are very hard up, and some, especially the senior men who are married and have families, are suffering very great hardship and can scarcely carry on at all. The married officer has two alternatives. He can either maintain a house in India and have his wife living with him, while the children are at home in England at a boarding school, or he can maintain a house in England and let his wife live there and have the children educated as home-boarders. In either case the position of the officer is well nigh desperate. If he maintains a house in India he will have to pay a third of his salary for house rent, for most I.C.V.D. officers are stationed in the greater Indian cities. He also has to pay the very high school fees for the children as boarders at home. If, on the other hand, he decides to live apart from his wife and maintain a house in England, he has to remit the greater part of his salary at the present low rates for household and educational expenses. He is, moreover, liable to pay British income tax on all remittances he makes to England for education and also on the allowance he makes his wife, in addition to Indian income tax if he goes on leave for a single day in any one fiscal year.

"Officers are now beginning to realise the hopelessness of their position. They have represented their case time and time again, but no notice is taken, and most I.C.V.D. officers have now

lost heart and are anxious to leave India as soon as possible, for, they argue, it is better to be hard up among their own people than to be in penury in the East, where appearances must be maintained. Several of the senior officers have already sent in their papers, and others are about to do so. The juniors, too, fully realise that there are no prospects in India for the Government civil veterinary surgeon, and are leaving; in fact, three who joined since the war have already gone, and two or three others are going at the first opportunity. All agree that the I.C.V.D. is the worst paid service in India, and holds out no prospects of obtaining a moderate degree of freedom from worry after many years' service, and has nothing whatever to offer the British veterinary surgeon but a life of drudgery and poverty in unhealthy and uncongenial surroundings."

Facts are stubborn things—and the above *are* facts. The whole affair is a tangle, but it can be unravelled if only we all work in unison. *Vis Unita Fortior* is the motto of our profession, and if we all stand together we can command our just recognition; for one thing at least is certain, neither in Great Britain nor in India can the profession be dispensed with, and the health of the public depends just as much upon the health of the animal world as does the prosperity of that backbone of every country, the agricultural community.

Original Articles.

SOME DISEASES OF ANIMALS COMMUNICABLE TO MAN.

By W. JACKSON YOUNG, F.R.C.V.S., D.V.S.M. (Vict.),
Inspector, Ministry of Agriculture and Fisheries, Examiner in Anatomy, Royal College of Veterinary Surgeons, Fellow of the Royal Society of Medicine.

During the course of my duties as a whole-time veterinary officer, many cases of communicable diseases have come under my notice, and it is with much pleasure that the following notes are submitted, in the hope that they will prove helpful in cementing the bond of union between the medical and veterinary professions.

Anthrax.

Cases have been encountered in veterinary surgeons, cowkeepers, stablemen, dock labourers and attendants at knackeries.

In the course of investigating an outbreak of anthrax a veterinary surgeon who neglects to inquire into the health of the persons who have handled the diseased animal or carcase is exceedingly careless.

Anthrax is one of two diseases (the other being glanders) in the domesticated animals that must be reported to the medical officer of the district by inspectors appointed to carry out the provisions of

the Diseases of Animals Acts, 1894 to 1914, and Orders made thereunder.

I have come across many cases of human anthrax, and in my experience the most common sites of lesions were fingers, forearm, face and neck. When caught in time, the cases contracted from the lower animals do not end fatally.

An excellent notice, giving three coloured representations of human anthrax in the skin (A) on first day, (B) on third or fourth day, and (C) later stage, is issued by H.M. Stationery Office at low cost.

It is highly desirable that this notice—which describes the symptoms—should be exhibited in every slaughterhouse, knackery, tannery, and in every dock warehouse and on all railway premises where hides are handled.

Many cases of anthrax in cattle are directly traceable to the spores being present in bone manure, and some bacteriologists have been successful in proving that the manure was thus contaminated. Before the days of mechanical manure distribution it is possible that many cases of human anthrax arose from bone manure.

A case of anthrax occurred in a dock labourer who became inoculated while handling orange boxes which were bound by pieces of goat hides. Recently my attention was called to a man who contracted anthrax on the lip after placing an infected knife in his mouth.

Anthrax in man and animals is not always fatal, and cases are on record where recovery has followed the administration of carbolic acid, chloral, turpentine and diffusible stimulants. An animal may improve under medicinal treatment for a time, then collapse and die suddenly, thus rendering prognosis very difficult.

Local swellings about the throat in animals affected with anthrax have been treated by the use of the needle cautery followed by the injection of tincture of iodine.

The veterinary practitioner who is called to examine an animal taken suddenly ill, or to examine the carcase of an animal found dead without a history of illness, should be mindful of anthrax, and no large incision into the carcase should be made until a microscopical examination of the blood has been made.

Prophylactic treatment consists of vaccination and serum treatment.

Anthrax can be controlled, and veterinary surgeons can do much to diminish the number of human cases by inducing stockowners to refrain from cutting the carcases of animals that die suddenly, and securing the adequate cleansing and disinfection of anthrax-infected premises. The Anthrax Order of 1910 is exceptionally well

framed, and is based on solid knowledge of the bacteriology of the disease.

Mange, Scabies or Itch.

Many cases have been encountered by me amongst stablemen and horse-keepers who have contracted the disease by grooming or handling diseased horses or the harness worn by them.

The sarcopt is the most serious parasite, and the lesions set up in human subjects are accompanied by severe itching, whi h is especially troublesome at night.

Lesions have been found in stable-workers on the forearm, chest and neck, and in one case which I saw, the back and thigh were also attacked.

Scabies is more easily contracted from the horse, cat, dog and pig than from the sheep. On many occasions I have handled over 100 sheep with scabies daily, and although conscious that the acari were escaping on my arms, I have not yet had the misfortune to contract the disease.

Ringworm and Favus.

Every veterinary surgeon engaged in cattle practice sooner or later meets cases of human ringworm, especially in cattlemen, milkers, and drovers. The most common parasites on cattle are *tricophyton ochraceum*, *tricophyton album*, and *tricophyton discoides*.

Children frequently contract ringworm and favus from affected cats or dogs, and milkers take ringworm on the wrists, forearms, and head. For some time I was actively engaged in general veterinary practice in a large city, and the surgery was situated in a very poor part of it. Numerous anxious parents used to call for advice regarding children with ringworm, and when advised to consult a doctor, nearly always replied that they had done so and that no benefit had resulted. The popular belief was that the medicines supplied by a veterinary surgeon were stronger.

Several medical practitioners were informed about the weakness of their treatment, and a working arrangement was arrived at for testing the efficiency of some non-poisonous remedies, and eventually the following treatment was found satisfactory:—

A liniment of 1 part of huile de Cade in 20 parts of cod liver oil was smeared over the scalp, and a cap composed of oil silk held in position by elastic was ordered to be worn.

Prior to the application of the liniment the hair was cut as short as possible and the scalp washed with pumicestone soap. Two applications at intervals of a few days, were usually effectual, and the hair soon grew normally.

Cow Pox—Vaccinia.

This disease is contracted by milkers, and usually affects the hands, forearm, chest and face.

The condition runs its course, and as cow-pox is mentioned in the schedule of the Workman's Compensation Act, a medical certificate is required. I venture to make the suggestion that a veterinary certificate should also be demanded, in order that the chain of evidence may be complete.

Glanders.

Fortunately, very few cases of this disease occur nowadays, either in man or animals in Great Britain, and it is hoped that glanders will be completely eradicated from this island this year. The Mallein test has rendered yeoman service in the campaign. The disease in man is not always fatal, as the writer knows a veterinary surgeon—at present in Glasgow—who survived a very severe attack.

In 1899 I saw a stableman affected ; he contracted the disease after administering medicine to horses which he was treating for supposed influenza. The horses did not make the desired progress and a veterinary surgeon was consulted, who had no difficulty in diagnosing glanders. The horse was destroyed but, unfortunately, the man died from the disease.

Influenza.

During the prevalence of equine influenza, especially that form of the disease in horses known as pink-eye, veterinary practitioners are frequently informed by horsekeepers and stablemen that they have contracted the disease from the horses.

It has never, however, been definitely proved that influenza in man is contracted from horses, or *vicê versâ*.

Diphtheria.

There is room for considerable research into the throat lesions found in dogs and cats which have been ascribed to the presence of the bacillus of diphtheria.

Repeated examinations of smears taken from the throats of the lower animals and from lesions in the teats of cows have failed, in my experience, to reveal the presence of any bacillus resembling that of true diphtheria.

Yeasts and sarcinæ are frequently found in the throats of dogs and cats.

Tuberculosis.

The bovine type of the bacillus is responsible for a very large percentage of cervical gland cases in children, and milk forms the connecting link in such cases.

A distinguished member of the veterinary profession died from

tuberculosis after becoming inoculated during a post-mortem examination.

It is highly desirable that all milk supplied to infirmaries, hospitals and sanatoria should be tubercle free, and that the cows should be examined at least once a quarter by an experienced veterinary surgeon.

In the event of a tuberculous cow being found on such inspection, her milk supply should be prohibited for human use, and she should be isolated and eventually destroyed.

Swine Erysipelas.

This is a septicæmic disease and the cause of high mortality, especially in warm weather. It has a wide distribution in Great Britain.

Many cases show verrucose endocarditis, and it would be interesting to know if men who contract swine erysipelas ever develop this lesion.

The writer of these notes has contracted the disease on three occasions, the lesions being situated on the fingers and back of hand.

It appears that the bacillus can enter through the pores of the skin. The human lesion is extremely painful, and takes the form of a spreading cellulitis with a distinct line of demarcation.

Treatment adopted consisted in the application of dry starch iodide maintained in position by means of a glove.

General Remarks.

Many diseases have not been mentioned in the above notes, as there are a large number of parasitic conditions common to man and animals.

It is doubtful if actinomycosis is communicable from animals to man. The medical and veterinary professions must no longer work in water-tight compartments, and it would be well if more discussions were held on topics of interest to both branches of medicine. The diseases conveyed by the eating of diseased or tainted flesh require careful consideration, and there is room for much research into the chemistry of alkaloids, ptomaines and leucomains and the symptoms following the ingestion of these substances.

The study of preventive medicine is common to both professions, and no course of training prior to examination for D.P.H. or D.V.S.M. can be considered complete unless demonstrations are given by medical and veterinary practitioners.

The value of early diagnosis in the communicable diseases cannot be overestimated, and it is clearly the duty of medical and veterinary practitioners to be thoroughly proficient with the differential diagnosis of such diseases, and to be fully conversant with their medico-legal aspects.

NOTES ON SOME DISEASES IN SOUTH AMERICA TRANSMISSIBLE FROM ANIMALS TO MAN.

By E. MORGAN, F.R.C.V.S., D.V.H.,
Puerto Cabello, Venezuela.

The Jigger (*Dermahophilus penetrans*).

This is the insect variously known as the "Negua" in Venezuela, and is believed to have been discovered by Orisdo in 1551. The home of this little insect appears to be South America, especially Brazil and Venezuela, from which it was conveyed to West Africa about the middle of last century, arriving on the West Coast of Loanda from Rio Janeiro by a ship, the *Thomas Mitchell*, in 1872, whose crew was suffering from jiggers. It was noticed probably in the Gold Coast for the first time in the early seventies. It appears to have spread across Africa by Stanley's Expedition and by trade routes, arriving in East Africa in 1895, and from East Africa it spread to India in 1899 by the 4th Bombay Infantry. In 1900 it reached Madagascar. It affects not merely man, but more so domestic and wild animals, especially the pig. In Venezuela it is largely kept in existence by the pigs.

It occurs in Mexico, West Indies, Central and South America, through the whole of tropical Africa, and as far south as Mashona. The female only becomes endoparasitic, and when it first arrives in a place, and is unknown, may cripple people and cause loss of toes, and people, such as natives, who usually walk barefooted, are liable to get tetanus, due to the wounds (small specks at first) in the toes and feet.

Life History.—The males and females live in dry, sandy soil as reddish-brown little insects, about 1 millimetre in length, and are very active. They live by sucking the blood of warm-blooded animals. When impregnated, the female burrows into the skin of a warm-blooded animal, such as the pig or human being. The abdomen now swells enormously into the size and appearance of a small pea. If one of these peas is examined it will be seen to show the head and thorax anteriorly and the two last abdominal segments posteriorly. The head is in the bottom of the burrow in the skin, and the posterior abdominal segments block the opening.

The eggs are expelled through the opening in the skin, after which the female jigger is expelled by ulceration. The egg develops into a larva with thirteen segments. The larva spins a cocoon, inside which is the pupa, which gives rise to the imago in about eight to ten days.

History of a Case Met With Personally.

A few years ago I was travelling on mule back through the interior of Venezuela, and one night, in a little hotel or "posada," I slept

on the ground floor with the door wide open (if there was a door there). I had placed my saddle and baggage under my bed. At night I suddenly heard some noise in the room. Thinking there were "robbers" I jumped out of bed on to the dusty floor and lit a match, and found about half-a-dozen pigs under my bed. I drove them out in a hurry. Of course I was barefooted. Next morning I was walking round the yard of the small lodging house and spied these scavengers there with jiggers in lumps on their limbs from claws to the knees and hocks. I was always very careful of not walking the floors barefooted on account of these "jigger fleas," as wherever there were pigs with jiggers one would find human beings as well with them. In a few weeks—a fortnight more or less—I felt an awful pain in my toe under my toe nail, so I asked my guide to examine it carefully, as I could not see anything, so eventually he said he could spot a small black speck under my toe nail,and he carefully opened and enlarged it with a sterilised needle, and out came the little sac full of the pea-like parasites. This is the only time I was molested, and I am positive in my mind it was at this place, as it was the only time I walked barefooted ; and those pigs were undoubtedly accustomed to sleep in that room at night.

I know one district in particular not very far from Puerto Cabello. We used to kill at the frozen meat works a great number of pigs from this place, and every pig had jiggers. I was so interested in this jigger question that I went specially to visit this little country town or large village, and very soon found that the pigs led a sociable life in and out of the human dwelling houses. After further inquiries, I found that almost every human being in the place was infested with jiggers, and many of the young men, labouring class, had their toes in all manner of shapes, and some of them had dropped off. I never saw such a sight in human feet. Some of them had penetrated far up the legs.

Undoubtedly, if the pigs were driven now and then through dipping tanks containing disinfectants and a proportion of oily material the jiggers would be reduced to a minimum, and, if reduced in pigs, human beings would soon be less liable to infection and *vice versa*. Other animals, such as dogs, are often molested. A lady from London brought a pet dog out here three years ago and it soon got these jigger nests between the claws. I got them all out and advised her to dress the region of the claws often with some disinfectant, and the dog was quite free ever afterwards by doing so.

Sarcosporidiosis.

This is a chronic infection caused by the invasion of the body

with *Sarcocystis lindmanni* (Rivolta, 1878), *Sarcocystis muris*, and, perhaps, other allied organisms.

Etiology.—The causation of sarcosporidiosis is the presence of some species of sarcocystis in man, but the method of entry is not obvious. It would seem possible that eating undercooked meat infected with sarcocystis might produce the infection, as Darling has shown that guinea-pigs can be infected by feeding them with rat's muscle containing *Sarcocystis muris* and by feeding them with the ripe sporozoites of the same species. In my opinion this is a very probable method of chance infection, because the buffalo meat in Ceylon is heavily infected.

The incubation period is from 152 to 164 days. During invasion the patient suffers from irregular fever, which may resemble enteric fever. In severe cases this fever may be complicated with myositis, and even necrosis, of the muscles.

Paragonimiasis.

Synonyms.—Parasitic hæmoptysis; pulmonary distomatosis; endemic hæmoptysis.

History.—The parasites were first discovered in the tiger and man. Found chiefly in China, Corea, Japan, Formosa, the Philippine Islands and Sumatra.

Etiology.—*P. westermani* occurs in the cat, dog, pig and man. How it infects man is unknown. It is more common in males than in females.

Pathology.—

1. Non-suppurating lesion	(*a*) in the skin.
2. The tubercle-like lesion	(*b*) in the bronchial mucosa.
3. The suppurating lesion	(*c*) in the intestinal mucosa.
4. The ulcerative lesion	(*d*) in the bile duct.

South American Trypanosomiasis.

Synonyms.—Oppilacao: Molestin de Carlos Chagus.

Definition.—Is an acute or chronic specific disease caused by *Trypanosome cruzi* (Chagus, 1909), and spread by the bug *Lamus megistus* (Burmeister), and, perhaps, other bugs.

History.—In February, 1909, Chagus reported that he had frequently found a trypanosome, which he named *T. cruzi*, in the intestines of a species of *lamus*, which occurred in the State of Minas in Brazil. He also reported that he was able to infect marmosets, dogs, cats, guinea-pigs and rabbits by the bites of the infected insects.

Chagus has shown that in all probability the armadillo, commonly called "tatu," and scientifically *Dasypus novemcinctus*, may be the reservoir for *Trypanosoma cruzi*, and that *Triatoma geniculata*, of the family Reduviidæ, is one of the carriers of the same trypanosome.

T. geniculata lives in the burrows of the armadillo, the flesh of which is rather a delicacy.

Climatology.—The disease is known among the poorer inhabitants of the State of Minas in Brazil, where it appears to attack the whole population, so that the children all become affected, and either recover, die, or pass into the chronic stage.

Etiology.—The above trypanosome is the cause, transmitted by *Lamus megistus* to domestic animals and to man. The reservoir appears to be the armadillo.

Symptomatology.—Acute and the chronic. Begins with violent attacks of fever in a young child or new-comer into the district. There is a palpable increase in the size of the thyroid gland. Œdema of the face, in which characteristic crepitation can be felt by palpation. Enlargement of lymphatic glands in various regions of body, especially the neck. The spleen enlarges and becomes painful. Liver also becomes enlarged, and there may be signs of meningitis and also of albumin in the urine. After a time the attack of fever may pass off, only to return after periodical intervals. During an attack the trypanosomes are found in the blood, and during a pyrexial interval they are absent.

Remarks.—Trypanosomes were found in the lower animals long before they were discovered in man. Gresby first used (1844) the term " trypanosoma " for a flagellate he had found in the blood of frogs in 1842. A similar parasite had been found by Valentin in 1841 in the common trout (*Salmo fario*). Very little progress was made in the investigations of these organisms until 1878, when Lewis, a native of Narberth, South Wales, who was in India, at that time described a trypanosome in the blood of rats, which was named by S. Kent *Trypanosoma lewisi.* In 1880 Evans, to whom the Steel Medal was awarded a few years ago, and who is alive to-day at Bryn Kinallt, Bangor, North Wales, who was a veterinary surgeon at the time in India, discovered a trypanosome in the blood of horses affected with surra—*Trypanosoma evansi* (Steel, 1885). This was a most important discovery, as it showed that trypanosomes were capable of producing disease, while previously it had been believed that these parasites had been harmless. In 1894 Bruce discovered the Nagana trypanosome, *Trypanosoma brucei,* and experimentally proved that the organism was conveyed by a species of tsetse fly (*Glossina morsitans*). Rouget, in the same year, observed a trypanosome in the blood of horses affected with dourine—*Trypanosoma equiperdum* (Doflein, 1901). Elmassian in 1901 described a trypanosome observed by him in mal-de-caderas—*T. equinum* (Voges, 1901). Theiler in 1902, in South Africa, found a trypanosome in the blood of cattle affected with a peculiar disease known locally as " galziecte," named by Bruce

T. theileri. Hence it is evident that the pioneers in trypanosomiasis are veterinary surgeons. How well the veterinary and medical have worked, and are still working, together in the tropics

RAT-BITE FEVER.

An acute febrile disorder of unknown causation, but probably caused by some protozoal parasite inoculated by a rat's bite.

History.—Rat-bite fever is mentioned in Japanese medical books from the ancient times, but it was not until Miyake in 1901 reported eleven cases that any interest was taken in the disease. Since then some twenty-one Japanese investigations, according to Hora, have reported some thirty cases, which recently have increased to a great number. It has also been recorded by Horder in England, by Proescher in U.S.A., and by Frugoni in Italy, who has given a good general account of the malady. In Ceylon the belief is that the rat's bite is only pernicious in the breeding season. In Japan Hora's case is stated to have been due to a bite of a female rat which was suckling its young. It is said that the same disease may follow the bite of a weasel, and it is a known fact that weasels kill and suck the blood of rats. It is an everyday occurrence on our own farm in Wales. Therefore it is possible that the infection may come in this manner to the weasel.

Etiology.—The causation is unknown, though Horder has seen a spirochæte, Ogatu a sporozoan parasite, and Proescher a bacillus.

Symptomatology.—Incubation period varies from one to three weeks, during which time the wound from the bite heals. The onset is sudden. The site of bite becomes red and swollen, and an ulcer forms, while the regional lymphatic glands become enlarged. There may be pains in the muscles and joints, and perhaps delirium. The attack may be repeated for months or years. The blood may show eosinophilia.

Types.—Three varieties: (1) Febrile, with marked eruption. (2) Febrile, with nervous symptoms. (3) Abortive type.

Diagnosis.—History of a relapsing fever associated with a purple coloured eruption, following a rat bite.

Prognosis.—Mortality 10·5 per cent.

Treatment.—Only symptomatic.

Prophylaxis.—Disinfect rat bite.

Remarks.—Closely allied to rat-bite fever is that known as spirillosis, or spirochoctosis, fever. It will be remembered that the late Alexander, King of Greece, died from this affection, transmitted through the bite of a diseased pet monkey.

PSITTACOSIS.

Definition.—A very fatal specific disease, epizootic among parrots, which is capable of spreading to man and causing a febrile condition

resembling typhoid fever in its character, and which is very liable to be complicated with severe pneumonia.

History.—Ritter in 1879 was the first to suspect that there was a connection between small epidemics of pneumonia limited to certain houses, and an illness among parrots in the same houses. His observations were confirmed by Ost, of Berne, in 1882, and by Wagner, of Leipzig, in 1885. In 1892 500 parrots were shipped from South America for Paris, but no less than 300 died *en route* from enteritis. On arrival in Paris the surviving birds were divided into two lots and sold to various people, with a result that within twenty-six days of their arrival an epidemic of psittacosis broke out, which resulted in forty-nine cases, with sixteen deaths. The epidemic was characterised by being of the house type, by which is meant that several persons in the same house were attacked by the complaint. Smaller epidemics had occurred in 1893 and 1894 in Banti; Malenchini and Palamidessi reported an epidemic in Florence. In 1901, at South Elpidio, Ancona and Hull; in 1904, at New Hampshire, in U.S.A.

Etiology.—Due apparently to a bacillus of paracoli group, first isolated from the wings of parrots which had died from the disease by Nocard in 1893, and by Gilbert and Fournier in 1897 in the intestines of the sick birds, and also in the heart-blood of a man who died from the disease. It is possible that this bacillus, which closely resembles the *B. typhosus* of Elierth, exists normally in parrots, and only becomes pathogenic under circumstances of bad hygiene, when it causes enteritis. The feathers, becoming contaminated with fæcal matter, are cleaned by the parrot with its tongue in the usual way, so that its mouth and bill become infected, and by this means the disease is spread to persons who feed or caress the bird. Very rarely does the disease spread from man to man.

Pathology.—In parrots the disease causes a very fatal form of enteritis. In man it produces a septicæmia, often complicated by a pneumonia, brought about as a rule by the pneumococcus.

Symptomatology.—Incubation period varies from seven to twelve days, after which the disease may begin suddenly with a chill, but more often commences insidiously, like typhoid fever, with headache, malaise, etc., and a rise of temperature from 102° to 104° F., with a pulse rate of 100 to 120 per minute.

Diagnosis.—Discovery of sick parrots in houses in which people are suffering from typhoid-like fevers and pneumonia. Bacteriologically, attempts may be made to obtain cultures of the bacilli from the blood.

Prognosis.—Grave in old people. When pneumonia sets in mortality is about 35 to 40 per cent.

Prophylaxis.—Infected parrots appear always to come from South America. Therefore care should be taken that only healthy birds are allowed to be shipped, and that these are kept in good hygienic conditions during the voyage. They should be quarantined on arrival for a couple of weeks, and, if found infected, destroyed and bodies and cages burnt. Parrots should not be allowed to take food out of people's mouths, and should be kept under good hygienic conditions.

MEDITERRANEAN FEVER, MALTA FEVER, GIBRALTAR FEVER, NEAPOLITAN FEVER, CYPRUS FEVER. FRENCH=FIEVRE CAPRINE, &c.

Definition.—Undulant or Malta fever is a chronic, rarely an acute, febrile disorder caused by *Micrococcus Melitensis* (Bruce), and probably other closely allied germs, and usually spread by the agency of goat's milk to man.

Passages are cited from Hippocrates recounting cases of long-drawn-out fevers lasting as long as 120 days in the neighbourhood of the Mediterranean for centuries, which may perhaps be this disease.

Mules, asses, horses, oxen, cows, rabbits and fowls are all apparently capable of spreading the infection, while often they do not necessarily show any symptoms of the disease. Monkeys fed with infected milk require an incubation period of fifteen days, while in human beings the period according to Johnstone is fourteen days.

Prophylaxis.—Simple. Avoidance of goat's milk, and prohibit importation of goats from Malta to other countries. The average number of cases in the British troops at Malta before 1906 used to be 240 per annum. Since 1906 condensed milk is supplied, and the cases decreased until in 1910 one case only was recorded.

Goats conveyed from Malta to America supplied the ship's crew with milk, and infected 53 per cent. of the men. The goats appear quite healthy, though sometimes a chronic mastitis may occasionally be noticed.

THE TICK FEVER OF MIANA.

Definition.—A specific fever of unknown cause, brought about by the bite of a tick—*Argas persicus* (Oken, 1818).

Symptoms.—Severe pain at site of the bite of the tick, and this is followed by remittent fever lasting from a few days to several weeks, delirium, convulsions and even death at times.

Prophylaxis.—The Persians burn their villages when they suffer severely from the attentions of the tick. It must be remembered that *A. persicus* is essentially a parasite of the domestic fowl and other birds, and that its eggs are laid in batches of 20 to 100 in cracks in the walls, and take three weeks to develop into the larvæ form, which, after sucking blood, in eight days becomes the nymph. It requires several weeks before it becomes the adult, which is said to feed only

once a month. It is obvious that fowls should be carefully disinfected. Kerosene and oil of sassafras are useful in the case of old birds, while young birds may be isolated in cages until the ticks drop off.

Relapsing Fever of West Africa.

Synonyms.—Tick fever (Livingstone); African tick fever.

Definition.—An acute specific relapsing fever caused by *Spiroschandinnia duttoni* (Nory and Knapp, 1906), and spread by the tick *Ornithodoros moubata* (Murray).

The people of Africa from time immemorial have had a dread of tick bites, which they thought caused fever, and this was noted by Livingstone, Kirk, Hinde and many other people.

Relapsing fever has been noted by Büldow in the Andes in 1865.

Etiology.—*Spirochæte duttoni* (1906) can be inoculated into a number of animals, namely, dogs, goats, sheep, rabbits, guinea-pigs, rats, mice, but not into cats, chickens, pigeons or gold fish.

The Relapsing Fever of Asia.

Caused by *Spirochæte carteri* (Manson, 1907). Inoculable into man, as proved by Carter, who inoculated himself twice with an interval of $2\frac{1}{4}$ years. It can be inoculated into monkeys, but not into rats and mice. Bugs retain it alive in their alimentary canal from four to seven days when obtained from monkeys, but do not seem to be so effective in obtaining it from man, as only one in fifty-three were found infected after feeding on human beings. Infected bugs are capable of transmitting the disease to monkeys. Sometimes the mortality may reach, in the so-called bilious remittent fever (teleric fever), as high as 70 per cent.

Dermanyssus Gallinæ (Redi, 1674).

Synonyms.—*Pulex gallinæ* (Redi, 1674); *Acarus gallinæ* (de Geer, 1778); *Dermanyssus adium* (Dugrs, 1836).

This parasite lives in cracks, etc., in the hen-house during the day, and attacks fowls at night, sucking their blood. It is also found on many other birds and mammals, and occasionally on man, generally poultry men, in whom its produces a pupular eczemative dermatitis on the back of the hands and forearms. *D. hirundinis* (Hermann, 1804), which is probably only a variety of this species, can also be found on man.

Holythyrus (Gervais, 1842).

Holythyrus coceinella (Gervais, 1842).

This arachnid is found on ducks and geese in Mauritius, and is said to attack human beings, causing swelling of the affected parts, which, if the lips or tongue of a child, may be dangerous.

GIGANTORHYNCHUS GIGUS (GORZI, 1782).

This parasite was alleged by Lindemann to occur in man in South Russia, where Schneider says melolantha is eaten raw. It is 10 to 15 centimetres long; eggs 80 to 100" long, with three shells. Its usual life history is that the adult is found in pigs, and the larvæ in *Melolantha vulgaris, Cetonia aurata* or *Lachnosterna arenata.*

The gigantorhynchidæ are large acanthocephala, with ringed, flat, tæniform bodies.

METASTRONGYLUS APRI (GMELIN, 1789).

Synonyms.—Gordius pulmonalis apri (Shel, 1777); *Ascaris apri* (Gmelin, 1789); *Strongylus suis* (Rudolphi, 1809); *S. paradoxus* (Mehlis, 1831).

M. apri is not uncommonly found in the bronchial tubes of pigs in Germany—Berlin, 60 per cent.; Leipzig, 15—52 per cent. Occasionally it infects other animals, including man. It causes pneumonia and bronchitis.

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A NEW TYPE OF DEVELOPMENTAL INTERSEXUALITY.

BY F. A. E. CREW, M.D., D.Sc.,
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ABNORMALITY of the reproductive system, taking the form of an intimate mixture of male and female structures belonging to the accessory sexual apparatus, is not uncommon among the domesticated mammals, and many cases in the human subject have also been recorded. The typical history in these cases is that an individual, regarded as a female during the earlier part of its life, later assumes many of the characters of the male.

This peculiar type of genital abnormality is particularly common in the goat. Cases are known in which an individual that actually won prizes as an immature female, from the time of sexual maturity became more and more like the male—its beard grew, its head became male-like, and about it there hung the pungent smell so characteristic of the male. In its behaviour it resembled the "rig," a male with mal-descended testes, but its external genitalia still retained the form of a vulva-like aperture with an abnormal clitoris.

When the internal genitalia from such a case are examined, there are found paired gonads, lying in the situation of the ovaries, or somewhere along the track of the migrating testis, which on section show the structure typical of the mal-descended testis; and an accessory

sexual apparatus composed of more or less well-defined epididymes, vasa deferentia, vesiculæ seminales, prostate, Cowper's glands, uterus and vagina, the last in some cases having failed to establish communication with the vulva.

Such an individual might be (1) a free-martin, (2) a female, not a free-martin, in which sex-reversal had occurred, or (3) a male in which the differentiation of the sex-equipment had been abnormal.

(1) A free-martin is a zygotic female co-twin to a male and the abnormality of her genitalia is produced by the action of the sex-hormone of the male which passes into her body through the vascular intercommunication established in their fused chorions. This fusion of the chorions of two-sexed twins has been demonstrated only in the cow. Moreover, in the case of the goat, these abnormal individuals occur not only as co-twins to normal males, but also as single births, as co-twins to normal females, and among triplets, the others being normal males or females. Thus, though certain of these cases can be explained on the same principles as the bovine free-martin, all cannot be.

(2) It is known that an individual which once possessed the organisation of the female and actually functioned as such may undergo such a transformation that it comes to possess the organisation of the male more or less completely. But in the type of case under discussion, no signs of a once functioning ovary have been demonstrated and in none is there any history of the individual actually functioning as a female or of having possessed the anatomical equipment of the female only.

(3) By far the most satisfactory explanation of these cases would seem to be that these individuals are males in which the differentiation of the sex-organisation has been abnormal.

Sex is determined by the nature of the genes which are brought into the zygote by the conjugating gametes, and by the interaction of these genes within a given internal environment. Sex-differentiation is the process during which the further development of the sex-equipment of the individual is pursued under specific control. It consists of two phases, the differentiation of the embryonic gonads into ovaries or into testes, and the modelling of the remaining structure according to one of two plans, the female or the male, under the direction of the internal secretions of the gonads, and probably of other endocrine organs (*e.g.*, pituitary and adrenal) in co-operation.

At the beginning of this process of sex-differentiation, the reproductive system consists of the paired embryonic gonads, a rudimentary accessory apparatus composed of the developing Müllerian and Wolffian

ducts, and external genitalia represented by the developing urogenital sinus with its genital tubercule.

In the male the gonads become testes with spermatogenic and interstitial tissues. The sex-hormone produced by the insterstitial cells, whilst encouraging the further development of the Wolffian ducts to become functional epididymes, vasa deferentia, and vesiculæ seminales, inhibits that of the Müllerian ducts, and guides the growth of the urogenital sinus and genital tubercle into prostate, Cowper's glands, scrotum, and penis. Though at present experimental evidence is incomplete on this point, there are numerous clinical indications that the full development of these structures, or at least the rapidity with which they develop, is conditioned by the internal secretions of other glands of the endocrine system, and further, that some attain full size and full functional powers only as the result of exercise. The appropriate sexual behaviour appears later as the individual approaches sexual maturity, while the morphological secondary sexual characters progressively become developed from this time onward.

In the female the gonads become ovaries and the sex-hormone inhibits the further development of the Wolffian ducts, but encourages that of the Müllerian ducts to become the functional uterus and vagina, and directs the formation of the vulva and clitoris from the urogenital sinus and the genital tubercle. The Müllerian ducts become canaliculised to establish a communication with the vulva.

There would appear to be two qualitatively distinct phases of activity of the interstitial cells of the gonad : the first during embryonic life which directs the modelling of the sex-equipment, and the second about the time of sexual maturity, which directs the assumption of the secondary sexual characters.

In the adult female there are commonly found vestiges of the Wolffian ducts and of the structures developed therefrom ; in the male there are found vestiges of the structures developed from the Müllerian ducts ; and the degree of the development of such varies in different cases. It follows from this that either the time of the exhibition of the internal secretions which direct the development of the sex-equipment or the potency of these secretions is variable.

The conditions found in the type of case under discussion suggest that there may have been (1) a complete absence of the interstitial cells during embryonic life, (2) a complete absence of their primary activation, or (2) a mal-development or mal-functioning during embryonic life of other endocrine glands, the action of which is necessary in addition to that of the gonads for the proper development of the sex-equipment. So far it has not been possible to define the exact cause of the condition for only full-grown animals have been examined.

But whatever may be the cause, it would appear that in the absence of the control of the endocrine glands during development the Wolffian and Müllerian ducts pursue an equal and parallel development under the common stimulus of nutrition to attain a considerable size, and to become differentiated into the various structures of the accessory sexual apparatus, and that the urogenital sinus, and its genital tubercle increase in size to form a large urogenital cleft, with a phallus in its ventral commissure.

If these structures grow in this way, then after a time they will have lost all embryonic plasticity, and will fail to respond to the stimulus of the sex-hormone when this becomes operative. The degree of development of the structures formed from the ducts which normally undergo atrophy will indicate roughly the time during development at which the sex-hormone produced its effects. Maldescent of the testes may be regarded as a result of imperfect differentiation in the male if it is assumed that the testis and the structures concerned with its migration pursue a corresponding and parallel development up to the point when normally the migration commences, and that if the development of the testis is abnormal, the proper association of testis and gubernacular apparatus is prevented.

There is, then, an undifferentiated but full-grown form of the sex-equipment in which the accessory sexual apparatus consists of equally well-developed male and female structures, and in the case of the human and of the domesticated mammals, this form is more closely mirrored externally by that of the immature female than by that of the immature male. Hence it is that a male in which the primary activation of the interstitial cells of the testis is absent will be regarded as a female until the time of the secondary activation, when the behaviour and the assumption of the secondary sexual characters will indicate the true nature of the case.

At the time of this secondary activation, the only structures still capable of responding are those concerned in the development of the secondary sexual characters, for in most cases these characters in the male are but the result of the further development of certain structures commonly possessed by the female, by the undifferentiated full-grown form, and by the immature male alike.

In certain of the cases examined, the vagina and uterus had the form of a closed sac ; the canaliculisation of the Müllerian ducts had been incomplete. The sac was filled with a purulent fluid containing plentiful coliform organisms or streptococci, and the uterine wall on section showed the structure of a uterus at that phase of the œstrous cycle known as " the period of destruction." No ovarian tissue of any sort was present, and there was no indication that any such tissue

ever had been present. It was impossible to believe that in the entire absence of the ovarian tissue a uterus could pass through various phases of the œstrous cycle producing this fluid, which later became infected, and it was assumed, therefore, that an infection from neighbouring organs had so affected the uterine tissues that they had assumed a structure which simulated in a most remarkable way that of a functioning uterus.

In the goat it is commonly held that the tendency to produce genital abnormality dates back to the year 1897, when three Toggenburg she-goats in kid were imported into Britain. These goats figure in the back part of the pedigrees of most modern British goats. It is reasonable, therefore, to suspect that this type of abnormality results from the mating of two strains which differ one from the other in the nature of the factors borne upon the chromosomes which determine sex and endocrine development. If one could raise large generations and could control the matings, it should be possible to produce at will any given grade of abnormality.

The interpretation offered can be extended to cases of similar abnormality in the human subject in which more than one case commonly occurs in the same family.

SUMMARY.

1. Genital abnormality taking the form of an intimate mixture of well-developed male and female structures of the accessory sexual apparatus is common among the domesticated mammals. In these cases the gonads are testes and the external genitalia have the form of a vulva and clitoris. The history is that a kid regarded as a female up to the time of sexual maturity assumes the secondary sexual characters and behaviour of the male.

2. These cases cannot be interpreted as free-martins or as instances of sex-reversal. They are males in which the differentiation of the sex-organisation has been abnormal.

3. This interpretation can be applied to similar cases encountered in the human which have been regarded as instances of hermaphroditism.

A FEW FACTS CONCERNING SHEEP AND DEATH AMONGST SHEEP FOLLOWING SHEARING.

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THIS shearing season has been an unfavourable one for farmers on the hilly districts of Wales on account of the cold and wet weather experienced in the month of July, which month is shearing time in these parts.

I wish to mention a few things in connection with sheep—such as shearing—which facts might be of some value to veterinary students whose knowledge of sheep in health and disease should be as perfect as possible, for sheep practice, if studied carefully, could be made to compensate to some extent for the loss of horse practice.

In the districts referred to above, veterinary surgeons are often called in to give evidence in law courts, and the judge and magistrates are greatly influenced in their verdict by the expert evidence of the veterinary inspector. It is only a few weeks since a farmer was summoned and fined for marking the ears of his sheep by cutting them with a knife. A veterinary surgeon was called to give evidence, but he only stated what he saw, without stating whether it was essential to mark the ears of the sheep or not.

Everyone who keeps a flock of mountain sheep knows that the marking of sheep's ears is most essential in order to identify them. An inexperienced man would say: "Why not use raddle or paint, or adorn the ears with tabs, instead of splitting the ears and causing the animal pain?" This applies also to branding the noses of sheep with a hot iron, or branding cattle on the body in the ranches of South America and elsewhere. People are not doing this for pleasure and with the idea of causing pain to the animals, but because, as far as we know, it is the only reliable means of identifying their animals and to prevent other people from stealing them. It is up to the people who shudder as they tell the tale of this cruelty to animals to invent something which will answer the purpose as efficiently as the methods mentioned above.

A short time ago a farmer in this district was accused of stealing yearling lambs and proceedings were taken against him. The complainant stated that defendant had docked the lambs with the idea of disguising them. The lambs were lost six weeks before. Expert evidence was called in to examine the scars on the tails, as defendant swore that the animals had been bred on his farm and that he had docked them prior to six weeks. This was a delicate question to decide. The farmer said that he had docked them in his own crude way. If a surgeon had operated on the sheep in a proper manner undoubtedly the wounds would have healed much earlier; but in this case the scab was still there. Here a delicate point was raised: How long after docking takes place should the wound completely heal, antiseptic precautions having been taken?

A few years ago, was a case which the R.S.P.C.A. took up against a large flock master for supposed cruelty to his sheep by branding them on the nose, which process could, according to the evidence of the inspectors of the above society, be easily avoided. The general

public, whose knowledge of the roaming habits of mountain sheep is often as clear as the mist on the Plynlimmon peaks, imagined that horns were growing on the branded scar, something similar to that of the rhinoceros. Owing to strong expert evidence in the defendant's favour the case was wisely dismissed.

Mountain sheep are considered the hardiest of our domesticated animals, and can withstand heavy snowstorms with very little to eat for several weeks on end ; yet during cold wet days at shearing time they appear to be very delicate, and cannot withstand the cold and rain during the few days following shearing. This proves that sheep, unless they have their clad coat of wool on their bodies, are unable to resist even the July showers, for one must remember that wool is a poor conductor of heat. The majority of deaths take place the first day and night after the sheep are shorn, particularly in the case of breeding ewes. This is due to the animals being in poor condition and less resistant to chills than barren sheep, which have a good covering of lanolin or yolk, which protects the skin from cold and rains. This is often lacking in old and lean breeding ewes. Besides, barren sheep at the time of shearing have a sufficient covering of new wool formed between the old wool and the pelt, a great proportion of which is left behind by the shearer, whereas in old lean ewes this is absent, and as anyone accustomed to shearing knows, it is far easier to clip these sheep on account of this new wool which replaces the old, sheep's wool being naturally changed once a year. This new wool forms a kind of space where one can easily pass the shears between the matted old wool and the skin. Unless this new wool is about half an inch in length it is wiser to postpone the shearing of such ewes for at least a few weeks. Even when the shearer manages to clip them he often leaves many cuts on the skin, and these are often three-cornered and small punctured ones, as he can only just get the points of the shears between the skin and the old wool. A sheep, when properly shorn, should show either an even surface, or (as is preferred by expert shearers in some districts) a regular undulated surface. This appearance cannot often be accomplished with an old breeding mountain ewe in poor condition. The majority of deaths occurred this season from two hours up to twelve hours after shearing. It has been proved by what we have seen this season that if sufficient good pasturage and shelter be allowed soon after shearing, including the first night, deaths can be kept at a minimum. I will give one instance out of many which we have witnessed.

Two farmers brought their sheep down from the hill the night before the shearing day and placed them indoors ready for the following day. A third farmer brought only a portion of his flock down from the

same land (which is a common) on the same day. The remainder of his sheep he brought down the following day, which was shearing day. He also placed all his sheep indoors. The results were as follows :—The former two farmers took their sheep back to the hill in the afternoon of a wet and cold day. They lost about 12 per cent. of their sheep, a few of which died within two hours after arrival on the hill. The third farmer dispatched up to the hill the same day only the sheep which he brought down that same morning of shearing. He lost none. He kept the others for the second night indoors (with the exception of a few which he placed on a part of a hill with plenty of pasture) and took them up the hill the following morning when the sun was shining, and, although they had been indoors two nights and a day, they all lived.

Death in the above cases was due to exposure to cold, accelerated by want of food. The production of body heat is thus lessened until the temperature reaches such a low level, and the metabolic processes are so seriously reduced, that life cannot be maintained. In order to maintain the temperature at a constant point heat production and heat loss must balance. The intake of food increases the production of heat in all animals, protein, by stimulating metabolism, being, practically effective in this respect, and in herbivora there is, in addition, a heat production due to the fermentative character of the food. In sheep wide variations in the temperature of the body compatible with health exist in this animal. Hobday* gives the temperature as ranging from 103·4° to 104·4° F., and thinks that 104° F. might be regarded as an average temperature. The heat lost by conduction, radiation and evaporation is greater in small than in large animals, for small animals have a relatively larger surface exposed in proportion to their body weight. Bulk of body is a safeguard in large animals against sudden loss of heat. It takes a considerable heat loss to lower the body temperature of a bulky animal, such as a horse or a whale. All warm-blooded animals living in the sea are bulky. Conversely in small animals, such as the sheep, the cooling surface is relatively greater than in large animals, and thus they must be able to increase rapidly their heat production.

It is most important that sheep should be provided with good pasturage and shelter for at least 24 hours following the shearing, otherwise the flock-master must expect heavy losses if the weather is wet and cold.

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A NOTE ON THE TRANSMISSION OF SURRA BY TICKS.

By Captain H. E. CROSS, I.C.V.D., M.R.C.V.S., D.V.H., A.S.C.,
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THERE are several ways in which different blood-sucking arthropods play a part in the spread of disease, *e.g.*, in some diseases the causal agent is carried direct from place to place through the agency of flies; in other cases the causal agent of the disease undergoes certain changes in the fly before the disease can be transmitted.

Though surra can be transmitted by direct transmission from animal to animal through the agency of certain *Tabanidæ*, many investigators believe that the disease is also transmitted by indirect transmission, and that a long period elapses between the time that the transmitting agent sucks the blood of an infected animal and the time when it becomes infective to other animals. Up to the present, all investigations regarding the transmission of surra have been carried out with a few specimens of *Tabanidæ*, *Stomoxys calcitrans*, and fleas. During our investigations on surra we came to the conclusion that the spread of surra cannot be confined to only the winged and comparatively short-lived insects or flies, but that those insects or arthropods which can survive for over a year may also have some bearing upon the spread of the disease. We have observed that—

(1) Surra breaks out frequently in the same district and stables though, as far as could be ascertained, the disease had not been imported into that district;

(2) In one outbreak of surra, the disease first made its appearance among ponies kept in a certain stable. For two years this stable was not used; two years later, when ponies were again placed in this stable, cases of surra appeared.

From enquiries made, it would appear that the ponies when placed in this stable were perfectly healthy, and had not come from a surra-infected area, nor were any animals in this area at the time when surra appeared amongst these ponies known to be infected with surra. The question arises, did these ponies contract the disease when at work, or was the disease contracted in the stable? If in the latter, the only explanation is that there were reservoirs of the disease in the stable that could survive for two years.

Several species of *Ornithodorus* are known to live for several years, and some of them can live without food for a year, and more if circumstances for getting food are unfavourable to them; they are in the habit of remaining in one place, and hide underground or in the crevices of walls during the period when they do not require food; they come out, usually at night, to feed on their host. Unlike many

other ticks, they complete their feed in a short time, and do not cling to their host for a long period as in the case with many other ticks.

In the Punjab only one species of *Ornithodorus*, known as *Ornithodorus lahorensis*, is on record ; there is another species—*Ornithodorus savignyi*—recorded from Gujrat District, Bombay Presidency, Central Provinces, and Madras Presidency. No other species of this genus had been recorded from India till we happened to find during our fly survey campaign a species near *Ornithodorus lahorensis*, but distinctly different from it in several minute details. This species was sent to Professor Brumpt, of Paris University, the well-known authority on ticks, for identification ; he informed us that the species is new, and proposed to name it *Ornithodorus crossi*. This species was found in large numbers in the Murree hills.

Sixteen transmission experiments were carried out with this new species of tick. These ticks were first fed on camels, in the peripheral circulation of which trypanosomes were present in great number. Some of these ticks were interrupted in the middle of their feed and after an interval of 1—20 minutes were allowed to finish their feed on healthy animals, whereas some were allowed to complete their feed on the surra-infected animal, and after varying intervals of 5—22 days were placed on healthy animals, but in no case was surra transmitted. Those ticks which had an interrupted feed and were after 1—20 minutes allowed to complete their feed on healthy animals, were again (after an interval of thirty-four days) placed on healthy animals, but in no case was a positive result obtained.

The maximum number of ticks used was 18, and the minimum 5.

Further experiments were about to be discontinued, as the above experiments apparently proved that this new species of tick was incapable of transmitting surra ; however, 10 ticks of this new species which 46 days previously had had a complete feed on a surra-infected animal, were allowed to bite a healthy animal, and the result was again negative. After a further interval of 21 days, when the ticks (both those which had interrupted and uninterrupted feeds) in the breeding vessels were hungry, they were fed on a healthy animal, and in addition to these ticks (42 in number) two *Ornithodorus lahorensis* which had 22 days previously been fed on a surra-infected animal, were fed on the same healthy rabbit this rabbit was under daily blood examination, and 10 days after the ticks had fed upon it, trypanosomes appeared in its blood. The minimum and maximum intervals between the feed on the surra-infected animal and this healthy rabbit were 22 and 67 days, respectively. As the appearance of the trypanosomes in the blood of this rabbit was most surprising, 36 of this new species of tick, after a further interval of 16 days, were fed on a healthy rabbit,

and the two *Ornithodorus lahorensis*, after an interval of 14 days, were fed on a white rat. The rabbit and rat were kept under daily blood examination; and after 11 days trypanosomes were observed in the blood of the rabbit, whereas the blood of the rat after 62 days' daily examination remained negative. The 36 ticks of this new species were again fed, after an interval of 18 days, on a healthy rabbit, in the blood of which trypanosomes were observed 8 days afterwards. These ticks transmitted the disease to a healthy rabbit 67, 83, and 101 days after feeding on an infected animal, but were not infective after intervals of one minute to 46 days; this would show that there is apparently a life cycle of the trypanosomes within the tick. How long the tick can remain infective, what changes take place in the life cycles of the trypanosomes within the tick, and the minimum number of ticks required to transmit the disease has yet to be determined; it also remains to be ascertained whether other species of *Ornithodorus* and other ticks are capable of transmitting the disease. It is not impossible that different species of ticks will be found capable of transmitting the disease (in the case of *spirochætosis* of fowls this disease is not only transmitted by one species of ticks, but by three different species of ticks). The fact that this new species of *Ornithodorus* is capable of transmitting surra after a long interval may explain why surra breaks out yearly or periodically in the same stables and in the same districts, though, as far as can be ascertained, cases of surra have not been imported into these stables or districts; the tick may act as the reservoir of the disease and thus the disease may be carried over from year to year. The fact that surra makes its appearance during the hot and rainy months may be due to the fact that many species of ticks hibernate during the cold months, and are most active during the hot and rainy season; as soon as one animal becomes infected the disease may rapidly spread during the rainy season from animal to animal through the agency of *Tabanidæ*. This paper is far from complete, but this note on the transmission of surra by ticks may be of interest to other investigators working on *Trypanosomiasis*.

NEMATODES AS A CAUSE OF OPHTHALMIA.

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In the family Thelaziidæ of the Nematodes are a number of genera which have their normal habitat in the lachrymal ducts of the eye of various species of mammals and birds. These parasites are found in the lachrymal duct under the membrana nictitans or on the conjunctiva beneath the eyelids, and occasionally in cysts formed by pockets in the conjunctival membrane. Raillet (1916) described the family and gave the following key to the genera :—

Family Thelaziidæ.

1.	Spicules equal	Galiceps
	Spicules unequal	2
2.	Mouth provided with lips or teeth	3
	Mouth without lips	5
3.	Mouth has six small papilliform lips ...	Serticeps
	Mouth has two lips or teeth	4
4.	Head ornamented with cuticular lobes ...	Schistorophus
	Head naked	Rhabdochona
5.	Male has caudal wings (bursa)	6
	Male without bursa ; short buccal capsule ...	7
6.	Vestibule elongated ; paired preanal papillæ	Cystidicola
	Short buccal capsule ; simple preanal papillæ	Ceratospira
7.	Obtuse tail, rounded, vulva anterior ...	*Thelazia*
	Tail pointed, oxyuriform ; vulva posterior	*Oxyspirura*

The most important of these genera from the point of view of the veterinary surgeon are the *Thelazia* and the *Oxyspirura.*

The genus *Thelazia* was created by Bosc in 1819 on material collected by a veterinary surgeon named Rhodes, who found the worms under the eyelids of an ox. Gurlt later found similar parasites in the lachrymal ducts of the horse and the ox.

Raillet (1916) gives the following generic diagnosis and list of species of the genus *Thelazia* found in domestic animals :—

Thelazia (Bosc, 1819), *Thelazius* (Bosc, 1819), *Thelazia* (de Blainville, 1819).—Mouth without lips, followed by a buccal capsule ; anterior border of capsule turned up outside and cut into six festoons by depressions, four of which are occupied by a small and very refringent papilliform body. Two cephalic and four submedian papillæ.

Male with an obtuse tail, ordinarily curved like a crochet, without lateral wings ; many preanal papillæ of which one is median, unpaired, and behind the cloaca ; three or four (?) postanal papillæ. Two unequal spicules.

Female with a conical tail, rounded, and carrying two lateral papillæ at its end. Vulva situated anteriorly a little behind the termination of the œsophagus ; two branches to the uterus which pass backwards. Embryos in the uterus.

Habitat.—The normal habitat is the excretory ducts of the lachrymal glands of mammals from which the worms pass out under the eyelids or on to the surface of the eye ; very exceptionally they may be found in the interior of the eyeball. Certain similar forms are found under the membrana nictitans of birds.

The species found in domestic mammals are :—

(1) *Thelazia rhodesi* (Desmarst, 1827) found in the lachrymal ducts and on the conjunctiva of cattle and buffaloes in France

(Neumann), Egypt (Piot-Bey), and Sumatra (Vryburg). This species has also been found in Malaya and in Central Africa in cattle.

(2) *Thelazia gulosa* (Raillet and Henry, 1910) found in the ox in the same positions as the above in France by Desleins and in Sumatra by Vryburg.

(3) *Thelazia alfortensis* (Raillet and Henry, 1910) found in cattle at Alfort in the same positions as the above.

(4) *Thelazia leesi* (Raillet and Henry, 1910) found by Leese under the eyelids of camels in India.

(5) *Thelazia lachrymalis* (Gurlt, 1831) found in the lachrymal ducts of the horse.

(6) *Thelazia callipæda* (Raillet and Henry, 1910) found under the membrana nictitans of the dog in India by Dale; also by Rennie and Evans in Burma.

The life history of these parasites is unknown, but it would appear probable that some fly acts as an intermediate host and transmits the parasite to fresh mammalian hosts. It is among the species of stomoxys or musca and allied genera that the transmitting agent may possibly be found, flies of these species being a constant source of annoyance to all domestic animals by their habits in attacking the orbital region.

The species *Oxyspirura mansoni* was first referred to by Cobbold in 1879 as *Filaria mansoni;* he had received the head of a fowl infested with this worm from Manson, who was then in Amoy. Magalhaes in 1888 described specimens collected in Brazil from the eyes of a fowl and a peacock.

Emmerez and Méguin (1901) described an ophthalmia of chickens in Mauritius due to a species of the same genus.

Ransom (1904) also mentions the specimens collected in Jamaica and in Florida in 1901 and 1902, which are in the collection of the Bureau of Animal Industry, U.S.A.; he calls attention to the fact that the parasite has only been reported from localities on or near the sea coast. This species is fully described by Ransom (1904). Sweet (1910) described a species of *Oxyspirura* which infests the orbital region of chickens in Australia; this she has named *Oxyspirura parvovum.* Dodd's description of the clinical manifestations in birds infested with this parasite is also given in this paper.

These two species, *O. mansoni* and *O. parvovum,* are the only two so far described as occurring in domestic animals, although there are a number of others described which have been found in various wild birds.

Ransom (1904) gives the following generic diagnosis :—

GENUS *Oxyspirura Drasche* (IN STOSSICH, 1897).

Generic diagnosis.—Filaridæ : Mouth without lips, surrounded by two lateral and four submedian papillæ. Pharynx present, membranous alæ on head generally lacking. Tail usually slender and acutely pointed.

Tail of male without bursal membranes, and with papillæ. Spicules two, unequal ; one long and filiform ; the other short and thick. Vulva, as a rule, situated in the posterior part of the body, a short distance in front of the anus.

TYPE SPECIES *Oxyspirura cephaloptera* (MOLIN, 1860 ; STOSSICH, 1897).

The life history of these parasites is not known, although Ransom's observation, confirmed by Dodd in Australia, that the infestations with this parasite appear to be confined to poultry on or near the sea coast would seem to indicate some intermediate host which has a similar distribution.

All the descriptions of the lesions which occur in mammals and birds infected with species of *Thelazia* and *Oxyspirura* agree to the extent that the presence of these parasites in the orbit is considered to give rise to the conditions found clinically, although in some cases the parasites may be present without having given rise to any noticeable symptoms.

The symptoms are at first lachrymation, photophobia, cloudiness of the cornea, later definite corneal opacities, and through secondary infections by suppurative organisms ulcers form, followed by iritis and pan-ophthalmitis. There are sometimes signs of irritation, and in birds particularly the eye may be injured by the efforts of the patient to relieve the irritation. As a result of the local reaction the eyelids and the membrana nictitans become swollen, and, owing to the drying of the purulent discharge exuding between the eyelids, the lids become stuck together, the globe of the eye becomes more and more involved, and is finally destroyed by the suppurative process. At this stage no worms can be found in the orbit. The nostrils and infra ocular sinuses may become affected in poultry and the lachrymal duct in mammals. The general health is affected not only by the loss of sight affecting the animal's means of seeking food, but the toxæmic condition which may arise as a result of the septic condition of the orbit may also cause death.

From the description of many observers on parasites found in the orbital region it would appear that the species of Filaria found in the anterior or posterior chambers of the eye itself in horses have been confused with the extra ocular parasites. It is necessary to distinguish such parasites from those of the genera *Thelazia* and *Oxyspirura*, here

under discussion. The species of these genera are normally extra ocular. Raillet and Henry (1913) mention that, in all their observations on the parasite found in the anterior chamber of the eye of the horse, the parasite has been a young form of the Filaria of the peritoneum of the ox [*Setaria labiato papillosa* (Aless)].

In many different parts of Nyasaland, Northern Rhodesia and Tanganyka territory the writer has observed the occurrence of parasites of the genus *Thelazia* on the eyes of cattle showing symptoms of conjunctivitis or ulcerative keratitis.

The condition was observed by G. Garden in the Shiré Highlands of Nyasaland in 1911, and was stated to be one of the most common causes of the fairly widespread occurrence of ophthalmia of bovines in that area.

Chambers, in describing his results on cattle with Wigg's suggestions for the treatment of ophthalmia by the injection of Lugol's solution of iodine into the tissues below the orbit, also mentions the frequency with which corneal opacities occur among cattle in North-Western Rhodesia ; he does not appear to have searched for parasites, as no mention is made of them in his paper.

The condition of a herd of cattle having animals infested with *Thelazia* first draws attention when one or more of the animals shows signs of photophobia with profuse lachrymation. On examination there may be any degree of corneal opacity from slight cloudiness to complete opacity. In cases that have been allowed to go on for some time without treatment there is usually a secondary infection by suppurative organisms and a condition of ulcerative keratitis. Mechanical injuries due to the loss of sight and the fixation of the membrana nictitans, which is unable to functionate through its swollen condition, may have aggravated the primary condition and thus have given rise to such gross lesions as rupture of the cornea with prolapse of the lens, the interior of the eyeball often becoming converted into an abscess cavity with complete destruction of the structures within.

The parasites are most easily found in patients showing the earliest stage of the clinical manifestations, *i.e.*, lachrymation with slight opacity of the cornea and little, if any, purulent discharge. The septic process due to the secondary infection by the suppurative organisms appears to kill off the nematodes, or at least to confine them to the depths of the lachrymal sac.

The *Thelazia*, although fairly long thread-like worms, varying in length according to the species from 6 to 12 mm. in males to 12 to 18 mm. in females, are not always easily seen in a cursory examination of the eye, as their usual habitat is in the lachrymal duct or below the membrana nictitans. It is necessary to fully examine the parts by

exposing the under surface of the membrana nictitans and the eyelids, when the worms can be detected by their active wriggling movements in the lachrymal secretion. They appear to be washed up with the tears from the lachrymal duct, as any manipulations or application of dressings which tend to make the secretion of the lachrymal fluid more profuse facilitates the recovery of specimens from animals that are harbouring these worms. In this manner the writer has recovered more than sixty specimens from a single patient, whilst it is usual to obtain an average of sixteen specimens from any animal that is infested with these parasites.

The only treatment necessary appears to be the removal of the worms mechanically and the instillation of a mild dressing, preferably one containing a cresol compound.

In the cases in which there are severe lesions of keratitis it has been found more convenient in dealing with large numbers of patients to use Wigg's method to set up a local counter irritant reaction, which is found to be beneficial in clearing up slight opacities and in reducing the more severe lesions so that partial, if not complete, sight may be restored to the great number of patients in which there is not a complete destruction of the cornea. The result of the treatment is to set up a local hyperæmia with œdema of the tissues around the orbit and an increase of the secretion from the lachrymal gland, which apparently tends not only to wash the lesions on the surface of the eye, but also removes the worms from the lachrymal duct, and in this manner allows the natural reaction of the tissues, to bring about repair of the damaged parts, to rapidly take place.

It is of interest to note that the actual cautery is used by natives in some parts of the regions around Lake Nyasa on cases of ophthalmia in cattle. " Line-firing " in a series of three to five short lines on the skin beneath the orbit is the method usually adopted. The disadvantage of this method, in countries in which animals constantly suffer from the attacks of stomoxys and various other flies, is that the parts so treated become infected with suppurative organisms, either from the feet of the flies or from the discharges which run over the cheek from the eye.

The eye troubles of cattle in South Central Africa are not by any means confined to those primarily caused by infestations with *Thelazia ;* injuries from pollen, awns of grass, thorns, and the sharp ends of burnt grass and shrubs all account for a certain number of cases. In outbreaks of *Trypanosomiasis* also clouding of the cornea with or without circumcorneal injection, photophobia, iritis and hæmorrhage and exudations into the anterior chamber may be observed, both in cattle and dogs as well as horses.

The *Thelazia* and the *Oxyspirura* have a fairly wide distribution, as they have already been recorded in every continent. *Thelazia* are recognised as a cause of ophthalmia in France, Egypt, India, Burma, Sumatra, Malaya, Mauritius, Central Africa and Brazil. *Oxyspirura* in the Far East, Australia, West Indies and the United States of America. It would appear probable, therefore, that species of these worms may be found in other countries as a primary cause of ophthalmia if the attention of practitioners was directed to more searching examinations of the eye for worms in the early stages of such infestations. In the later stages it would be difficult to distinguish these eye lesions from those due to other causes, owing to the changes brought about by the suppurative organisms, which soon gain access to the eye infested with these nematodes.

These parasites of the eye are of considerable economic importance; the losses they cause by the reduction in value of all infested domestic mammals and birds, through causing partial or complete loss of sight, may be judged from the fact that the writer has frequently found that infested herds of cattle have had as many as 10 to 20 per cent. of the animals suffering from loss of sight in one or both eyes; an observer in India (Chetty, 1922) states that 40 per cent. of the bullocks, in an outbreak which he observed, suffered from loss of sight. In fowls, in addition to the eye lesions, the catarrhal inflammatory condition extending to the upper respiratory tract may be a cause of mortality when present as a complication.

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PRENATAL INFESTATION WITH PARASITIC WORMS.

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In an article on the above subject Cort (1921) mentions the carefully worked out experiments of Japanese observers on *Schistosoma japonicum* in pregnant dogs—Fujinami and Nakamura, who reported in 1911 the finding of *S. japonicum* in the fœtus of a bitch suffering from schistosomiasis; and Narabayashi, who, in 1914, caused pregnant animals to become infested with the cercaria of *S. japonicum.* In one dog thus infested Narabayashi found the parasites in five out of seven embryos, and in a later series of experiments was able to find fourteen young specimens of *S. japonicum* in the placentas of two pregnant guinea-pigs that had been experimentally infested. To find these worms it was necessary for him to examine 20,000 sections of the placenta. He found the young schistomes most frequently in the blood vessels running from the placenta to the embryo, and he concluded, therefore, that the larvæ of *S. japonicum* in prenatal infestation are carried to the placenta in the blood stream, migrate through the thin membrane separating the circulation of the mother from the fœtus, and are carried to the embryo by its own blood vessels. The shortest time after the infestation of the mother in which the worms were found in the fœtus was seventeen hours.

Neveu-Lemaire in 1912 reported two cases of prenatal infestation in lambs with the common lung worm, *Dictyocaulus filaria.* In the first case the adults of this species were found in the trachea of a lamb that died four days after birth, and in the other they were found in the trachea of a fœtus taken from a mother heavily infested with the parasites.

The discoveries of workers during the past few years of the wanderings of *Ascaris lumbricoides*, and other related forms, indicate that the migrations of nematode larvæ in their final hosts are more common than has been suspected. In forms in which such migrations occur it would seem possible that prenatal infestation may take place.

The researches of Stewart, later confirmed by Ransom and Foster, have shown how the larvæ of *Ascaris lumbricoides* pass from the intestine to the lungs; such wanderings of larval forms appear to take place in the course of the life history of several other kinds of nematodes, notably various species of Filaridæ, Trichurinæ and Strongylidæ.

Stewart (1917) concludes from the results of his experiments on *Ascaris lumbricoides* that the larvæ normally travel to the liver and then to the lungs *via* the mesenteric and portal veins, or *via* the bile duct. The former course he considered more probable. From the

liver he assumed that the larvæ pass *via* the hepatic veins into the heart, and from there to the lungs. In the latter organ after increasing in size, but before attaining maturity, the larvæ pass into the bronchi, travel up the trachea and down the œsophagus to the intestine.

Yoshida (1919), in experiments on guinea-pigs, found ascarid larvæ, after ingestion of embryonated eggs, in the abdominal cavity, spleen and pleural sacs. He considered that the larvæ reached these positions by boring through the tissues or between the organs in the path of their migration.

Ransom and Cram (1921), in opposition to the views of Yoshida, clearly demonstrated that the passage of the larvæ of sacaris is by way of the portal vein to the liver, thence by the hepatic veins and vena cava to the right side of the heart, from which they reach the lungs in the pulmonary arteries. Larvæ are commonly present in the peripheral lymph nodes, spleen, kidney and other viscera, presumably from the systemic circulation. These workers were thus able to support Stewart's views.

Fülleborn (1921) has confirmed the experiments of Ransom and Cram as to the course followed by the larvæ in the circulatory system. Further experiments show that the larvæ pass from the veins to the arteries not only by boring their way through the capillary walls, but also by passing along the channels of the capillaries. In Strongyloides, at least, the typical hæmorrhages in the lung are caused by the borings of the larvæ. By the blood stream ascaris larvæ should eventually reach the placenta—a supposition which has proved correct, for the finding of two to three weeks' old Belascaris in dogs four to five days' old is reported. This author also carried out experiments to prove that Belascaris in the dog does not need an intermediate host for development. He injected thousands of Belascaris larvæ under the skin of a pregnant bitch thirteen days before the birth of the puppies, and, whereas in most new-born puppies only a few Belascaris are found, in each of these over a hundred were present in the intestine. Fülleborn was also able to prove that the small cysts (0·3—0·5 mm. in diameter) which occur in the liver, kidney and muscles, etc., of dogs are due to Belascaris—each contains one or two small worms ; the encapsuled larvæ can remain alive for many months. If material containing such cysts is fed to mice or guinea-pigs, the animals develop similar cysts, which shows that the capsule is digested and the free larva behaves as if it had just escaped from its egg ; a dog also may be infected in the same way. The pathological importance of these cysts is not known.

Fülleborn ([5]) remarks on the numerous worm patches on the

lungs of his experimental dogs, which to the naked eye look just like a tubercle lesion.

In South-Central Africa (Portuguese East Africa, Nyasaland, Northern Rhodesia and the southern part of Tanganyka Territory) gross infestations by *Ascaris vitulorum* of young calves are of common occurrence, and in untreated cases the rate of mortality may be very high. The mortality from this cause is confined to animals between ten days and six weeks of age.

Fully mature species of male and female *Ascaris vitulorum* have been collected by the writer from calves that died between the tenth and fourteenth day after birth, as many as 40 to 120 specimens of the parasite being found in the stomach and intestines in each case. Immature forms up to five inches in length have been collected from animals that died between the fourth and sixth day after birth. In view of the observations of Ransom and Foster (1920), in experiments with ascaris on the pig, and those of Epstein (2) (1892), in experiments on *Ascaris lumbricoides* in human subjects, that about 2½ months were required for the complete development of these parasites after infection of the host ; it would appear, even though the development of *Ascaris vitulorum* be very much quicker, to be impossible for the parasite to attain its full size and sexual maturity within ten to twelve days after infestation, and therefore prenatal infection appears to offer the only reasonable explanation.

It is a notable fact in the regions in which the gross intestinal infestations with *Ascaris vitulorum* are so common that pulmonary ascariasis in calves has not been observed, although hæmorrhagic infarcts, which are due to migrations of the larvæ, are very common in the lungs of adult animals. *Ascaris vitulorum* does not, however, appear to find the alimentary tract of the adult ruminant a suitable habitat, as it is rarely found as a very heavy infection (usually not more than two or three specimens being present).

Pregnant cows, as well as other animals, become heavily infected by the ingestion of foodstuffs contaminated with embryonated eggs of *A. vitulorum*, as may easily occur on the dirty pastures immediately surrounding a village or settlement, and this is proved by the fact that it is in areas where cattle are crowded, the pasture area being limited, that infestations are most common. Cirrhosis of the liver, as a result of the migrations of the larval parasites, is a lesion which is fairly frequently seen, and also infarcts in the kidneys, in addition to those seen in the lungs.

No experiments with *A. vitulorum* have so far been attempted with the object of inducing a prenatal infestation in cattle.

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THE LARYNX OF THE DOG.

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THE larynx of the dog differs in several particulars from that of the horse. In proportion to the size of the animal it is shorter and wider, and there is greater mobility between the constituent cartilages. These differences explain to a certain extent the greater range of voice in the canine species.

There are three single cartilages in the dog's larynx—cricoid, thyroid, and epiglottis; and two paired—cuneiform and arytenoid. The last-named has attached to it a corniculate cartilage.

CRICOID CARTILAGE.

This is a complete ring of cartilage forming the posterior part of the wall of the larynx. In shape it somewhat resembles a signet ring, laterally compressed. The dorsal part of the ring is in the form of a flat plate, termed the "lamina," which carries a low longitudinal ridge in the middle line. On either side of the ridge the lamina is depressed. At each postero-lateral angle of the lamina there is a concave facet which forms a synovial joint with the posterior corner of the thyroid cartilage. On the anterior edge there are also two facets for articulation with the arytenoids. These facets are oval in shape, convex in both directions, and nearly touch one another

in the middle line. They are of such an extent as to allow a very considerable range of movement to the arytenoids. The lateral and ventral parts of the ring make up the "arch." The lateral surfaces of this show wide grooves for the attachment of the crico-thyroid muscles. Ventrally, the arch is very narrow from before to behind. The posterior edge of the arch is thin and united to the first ring of the trachea by an elastic membrane, the crico-tracheal membrane. The anterior edge of the arch is oblique in direction, and on either side is thickened for the lateral crico-arytenoid muscle. In the middle line it is notched. This edge is joined to the thyroid cartilage by the crico-thyroid membrane. The inner surface of the cricoid is smooth and covered by mucous membrane.

THYROID CARTILAGE.

The thyroid cartilage consists of two plates or "laminæ" joined together at an open angle by their thickened ventral edges to form a short but wide gutter. The junction of the two plates is known as the body. At each end of the dorsal edge there is a process or "cornu." The anterior cornu is joined to the extremity of the thyro-hyal by means of a small synovial joint. Below this cornu there is a rounded notch through which passes the superior laryngeal nerve. The posterior cornu is stronger than the anterior, and bears a rounded articular surface for articulation with the cricoid. The anterior edge of the lamina is thin and attached to the thyro-hyal and basi-hyal by the thyro-hyoid membrane. The posterior edge is concave in its length, and joined by the crico-thyroid membrane to the cricoid. It also serves for the attachment of the crico-thyroid muscle. The outer surface is slightly convex and crossed obliquely by a faint line for the attachment of the thyro-hyoid and thyro-pharyngeus muscles. At the upper extremity of this line, near the root of the posterior cornu, there is a prominence for the sterno-thyroid muscle. The inner surface is smooth and concave, and at its junction with its fellow at the body shows the attachment of the vocalis muscle and the vocal cords, and in front the ligament which connects the epiglottis to the thyroid.

EPIGLOTTIS.

The epiglottis is a curved quadrilateral plate placed diagonally at the entrance to the larynx. Its largyneal surface is concave from side to side and convex from before to behind and covered with mucous membrane. The under surface is also partly covered with mucous membrane, and near its posterior angle the hyo-epiglottic muscle is attached. The anterior angle projects freely into the pharynx; the lateral angles are connected to the arytenoid cartilages by the ary-epiglottic folds. These folds also cover the extremities of the

cuneiform cartilages, which form very distinct prominences. The posterior angle is produced to form a stalk which is fixed by the thyro-epiglottic ligament to the body of the thyroid.

Arytenoid Cartilages.

The two arytenoids are placed in front of the lamina of the cricoid, partly between the laminæ of the thyroid. Each is somewhat pyramidal in shape, possessing three surfaces, three angles, a base and an apex. The base is directed posteriorly, and articulates by a large concave oval facet with the anterior edge of the cricoid. The apex, directed forwards, is produced upwards by a rod of cartilage called the "corniculate," or the cartilage of Santorini. Of the three basal angles the lateral is known as the muscular process as into it the muscles moving the cartilage are inserted. It partly overhangs the articular surface on the base. The ventral angle forms the vocal process to which the vocal cord is attached. The medial angle of the base is joined by the inter-arytenoid ligament to the same angle of the other arytenoid, and the junction is surmounted by a slender cartilaginous rod, the "inter-arytenoid" cartilage. Of the surfaces of the arytenoid the medial is smooth and covered with mucous membrane; the dorsal and lateral surfaces are partly covered with mucous membrane and partly with muscles.

Cuneiform Cartilages.

These are also termed the cartilages of Wrisberg, and in the dog are of considerable size, and not fused with the epiglottis as they are in the horse. Each is a curved rod with a flattened base. The dorsal extremity forms a curved projection which lifts up the ary-epiglottic fold into a distinct prominence, between the lateral angle of the epiglottis and the apex of the arytenoid. The lesser curvature of the cuneiform is turned posteriorly, and just below its middle is united firmly to the corresponding corniculate cartilage. The flattened base of this cartilage has inserted into it the small ventricularis muscle.

Joints, Ligaments and Membranes.

The crico-thyroid joints are diarthroses between the posterior cornua of the thyroid cartilage and the cricoid, and each is provided with a capsular ligament.

The crico-arytenoid joints are also synovial, and occur between the cricoid cartilage and the arytenoids. They allow a considerable range of movement to the latter.

The thyro-hyoid joints are formed between the anterior cornua of the thyroid cartilage and the extremities of the thyro-hyals. They are synovial, and are provided with capsules.

The transverse arytenoid ligament is a band of fibrous tissue

uniting the medial angles of the two arytenoids. It is surmounted by the interarytenoid cartilage.

The thyro-epiglottic ligament is a stout cord of elastic tissue connecting the epiglottis to the body of the thyroid cartilage.

The vocal ligament is an elastic cord stretching from the vocal angle of the arytenoid cartilage to the body of the thyroid behind the insertion of the thyro-epiglottic ligament and close to the insertion of its fellow. It forms the foundation of the vocal cord.

The ventricular ligament is not very distinct. It is a fibrous band between the base of the cuneiform cartilage and the body of the thyroid. With its covering of mucous membrane it forms the so-called false vocal cord.

The crico-thyroid membrane is elastic, and is attached to the anterior edge of the arch of the cricoid cartilage and to the posterior edge of the thyroid, so completing the wall of the larynx between these two cartilages. Ventrally it is thickened by longitudinal fibres, and laterally it is covered by the crico-thyroid muscle.

The thyro-hyoid membrane stretches between the anterior edge of the thyroid cartilage and the body and thyroid cornua of the hyoid bone. Laterally it is hidden by the thyro-hyoid muscle and ventrally by sterno-hyoidens.

The crico-tracheal membrane fills in the space between the cricoid cartilage and the first ring of the trachea. It is fairly wide, and so allows a large amount of movement between the larynx and trachea.

Muscles.

Extrinsic.

Sterno-thyroidens.—The laryngeal attachment of this muscle is at the tubercle upon the lateral surface of the thyroid wing near the dorsal edge.

Thyro-hyoidens is a flat and broad muscle lying on the wing of the thyroid cartilage and the lateral part of the thyro-hyoid membrane. It is attached to the thyroid cornu of the hyoid bone and to the oblique line on the lateral surface of the thyroid wing. It draws the larynx forward if the hyoid bone is fixed.

Hyo-epiglotticus may be looked upon as a single unpaired muscle in the middle line, or as a pair of muscles partly fused together. It arises by a double head from the body of the hyoid bone, and is inserted into the ventral surface of the epiglottis. It is well developed, and it draws the epiglottis towards the tongue.

Intrinsic.

Crico-thyroid is a short but wide muscle arising on the lateral surface and anterior edge of the arch of the cricoid, and being inserted into the posterior edge of the thyroid wing and the adjacent parts of the sur-

faces. The direction of the muscular fibres is upward and forward. The action of this muscle is to draw the ventral parts of the thyroid and cricoid towards one another, and, the arytenoids being fixed, the vocal cord is then tensed.

Crico-arytenoidens dorsalis.—This muscle is somewhat triangular in shape. The base is attached to the dorsal surface and ridge of the lamina of the cricoid. The fibres converge from here to become inserted into the muscular process of the arytenoid. The action of the muscle is to rotate the arytenoid outwards. This movement naturally widens the opening between the two arytenoids.

Crico-arytenoidens lateralis.—This is smaller than the last named. It arises from the anterior border of the arch of the cricoid and is inserted into the muscular process of the arytenoid. It is covered laterally by the wing of the thyroid cartilage. It pulls the muscular process downwards and backwards, and so approximates the vocal cords and diminishes the width of the glottis.

Arytenoidens.—This muscle is poorly developed in the dog. It is unpaired, and is attached to the dorsal surfaces of the two arytenoids and also the inter-arytenoid cartilage. When it contracts it brings the arytenoids nearer to one another, thus narrowing the glottis. In this action it aids the lateral crico-arytenoid muscle.

Vocalis.—This, with the next muscle, makes up a muscular mass which is sometimes called the thyro-arytenoidens, but in the dog these muscles are preferably looked upon as distinct from one another. The vocalis is a considerable muscle attached above to the muscular process of the arytenoid and below to the body of the thyroid. For it to be seen clearly the wing of the latter cartilage must be cut away. Its action is to lift the thyroid body towards the arytenoids and so slacken the vocal cords.

Ventricularis.—A very slight muscle attached below to the base of the cuneiform cartilage and above to the arytenoid in the region of the muscular process. It aids the vocalis. Between these two muscles is seen a mucous-lined pouch, the ventricle of the larynx.

The Cavity of the Larynx.

The cavity of the larynx communicates anteriorly with the pharynx, and posteriorly with the trachea. At about its middle it is constructed by the presence of folds of mucous membrane stretching from the arytenoids above to the body of the thyroid below. These folds, which embrace the vocal ligaments, are known as the vocal cords. The opening between them is the glottis. The upper part of the glottis is limited laterally by the arytenoid cartilages, so that the glottis is partly inter-membranous and partly inter-cartilaginous. The calibre of the glottis varies with the different movements of the cartilages.

In front, and external to the vocal cord, is seen an opening which leads into the ventricle of the larynx. The anterior border of the opening is formed by another fold of mucous membrane, the ventricular fold.

That part of the cavity of the larynx in front of the glottis is known as the vestibule, and is in free communication with the pharynx. It is limited in front by the epiglottis and on each side chiefly by a fold of mucous membrane, the ary-epiglottic fold, which forms a ridge between the lateral angle of the epiglottis and the apex of the arytenoid. The fold shows a projection caused by the underlying cuneiform cartilage.

Behind the glottis the cavity is spacious, somewhat laterally compressed, and continuous with the lumen of the trachea.

The ventricle, the entrance to which is found between the voca cord and the ventricular fold, extends laterally and forwards as a blind mucous pouch to become related to the medial surface of the thyroid wing and the vocalis muscle. Medially it is related to the ventricularis muscle, and its blind extremity extends as far forwards as the anterior edge of the thyroid wing.

Translations.

REGARDING PERIODIC OPHTHALMIA.*

By G. CHENIER.

THE communication of M. Mathaly on "Periodic Ophthalmia" has brought back to my mind facts recorded in 1877-78, during the classification of horses in the Hautes-Pyrenées.

In the plain of Tarbes periodic ophthalmia is very rare south of the town; I have only met with one case, possibly introduced from elsewhere. It is, on the contrary, very common in the north, principally in the districts of Borderes and Andreof. After a survey of local conditions I reached the following conclusions:—The lands to the south of the town are irrigated by water descending from the mountain, which one can consider as clean; that to the north receiving some sewer water, by the irrigation canal of the Adour, which passes through the town.

Deduction.—P. Ophthalmia may be a malady of an infectious nature, or, rather, parasitic, the parasite evolving in the cristallin. This theory is, I recognise, speculative, but more than once the error of yesterday becomes the truth of the next day. H. Bouley, who analysed the work which I had drawn up on this subject, was not inclined to reject purely and simply my suggestions. He estimated

* Extract from *Recueil de Medicine Veterinaire*, March 30, 1922.

that it would be of interest to probe the question by suspension of irrigation for some years in the districts affected. After the publication of my work the parasitic theory received a new recruit in Krzyztopowicz, who believed the causative organism was a fungi developing on the cornea and penetrating to the interior of the eye.

THE DIAGNOSIS AND THERAPY OF TRAUMATIC GASTRITIS.

By J. RUEGG, Veterinary Surgeon,
Andelfingen.

A very high percentage of necessary slaughters in cattle are carried out as a result of injury of the wall of the reticulum through pointed objects swallowed, a fact which makes every improvement in diagnosis of this malady valuable. Only an early diagnosis makes it possible to introduce, for a useful space of time, those methods of treatment which give a prospect of success.

The diagnosis of traumatic gastritis in most cases is not difficult for the veterinary surgeon ; the symptoms are generally very plain. In not a few cases anamnesis establishes the diagnosis. In a more or less large remainder of the cases the usual methods of examination suffice. In those cases in which we do not succeed in causing the animal to evince pain by pressure at the back of the breast-bone, on the back, leading out up a hill, etc., I recommend the following procedure, which I have carried out for some years. (As far as I know it has never appeared in professional literature.)

The patient is taken to a quiet place where there is nothing to excite or divert its attention ; examination in the stall or standing is naturally unsuitable. An attendant holds the head of the animal so high that the brain and forehead are horizontal, but employment of force is to be avoided ; gently raise it with the halter. When the animal is quite placid the well-known grip and pressure down on the back is made. When no plain signs of pain arise from this, then the examiner places himself in front of the animal's head, grasps the nostrils with as little pressure as possible, grasps the tongue with the other hand, pulls it slightly forward, and holds it there whilst a second helper causes the patient to bend its back by a grip behind the withers. If the animal reacts, as shown by the characteristic short grunts or groans, the diagnosis of traumatic gastritis is certain. In only a very few cases in which the condition is actually present will this manipulation fail to produce a reaction, and such are mostly cases in which severe general disturbances have greatly dulled the sensorium, and the prognosis is so unfavourable that treatment is out of the question.

As for *therapy*, I am strongly of opinion that it is wrong to have every animal suffering from traumatic gastritis slaughtered. The

cases are frequent enough in which the injury of the reticulum heals up without the usefulness of the animal being long impaired, so that such pessimism is not justifiable. Whether in concrete cases treatment should be undertaken is in great part an economical question, which depends on the present condition of the animal and what it is intended for. Fat animals and subjects in which severe derangement of general condition has resulted from diffuse peritonitis and so on should be slaughtered as soon as possible. In relapses slaughter is also to be recommended, because here a purulent process has generally begun. Cattle of high value from a breed or utility point of view, in which complications of a severe nature are not present, should be treated.

The most important therapeutic measure is without doubt the placing of the fore end of the cow on a higher level than the rear, then regulated diet—for instance, for a few days no food and as little water as possible (meal drinks) ; later on a little solid food and hot packs behind the chest are useful. Medicines should not be given, and especially those which excite the action of the rumen ; opium preparations are more indicated. The right position of the platform to raise the fore-end of the cow is important. The standing place of the patient must be so chosen that molestation by the neighbouring animal is excluded. Near the crib the platform should have a height of 4 to 6 inches and fall gradually away to the hind feet of the animal. This may be made of strong, not planed (rough), planks firmly bound to one another. A badly-constructed platform makes the animal restless, and hinders the progress of recovery. On this platform the animal is kept standing uninterruptedly for two or three weeks, and any quick movement of the patient is to be avoided, and this must be borne in mind when making physical examinations of the subject. The patient must remain for a time under control of the veterinary surgeon, so that, if undesired complications occur, the right moment for slaughtering may not be missed. I know quite well that my experiences with therapy in this complaint are nothing new to the professional man. Still, the result of a carefully carried out treatment is quite favourable in many cases, and there need not be so much pessimism about the prognosis of traumatic gastritis, but, on the contrary, very often a justifiable optimism.—*Swiss Veterinary Journal.*

G. M.

PIROPLASMOSIS OF THE DOG.

By M.M. A. MARTIN and R. LASSERRE.

Symptoms.—The malady makes its appearance after a day's sport, during which female ticks fix themselves on the skin of the dogs and the first symptoms appear after a period of incubation of which the duration is difficult to determine. It appears that it is generally

seven to ten days. During its evolution the acute or chronic form may be revealed.

Acute Form.—It is often termed "malignant jaundice, bilious fever." It is shown by dullness, dejection and weakness; the animals remain recumbent, eat less; at times anorexia is complete; rigors appear, and there is vomiting, alimentary, mucous or bilious; nose is dry, hot; the eye dim. Temperature goes up and rapidly reaches 102 to 105° F., and may exceed 105½° F. Pulse is small, thready and accelerated (120 to 160). Breathing, 30—48 per minute. Fever persists for several days, with daily oscillations, and soon gradually diminishes and falls to normal or less. Methodic and deep palpation of the left hypochondriac region sometimes enables one to make out hypertrophy of the spleen, and frequently abnormal sensibility of this organ. Other more significant symptoms are *hæmoglobinuria.* It appears early, one to three days after inappetence and dullness, lasts for some days, as long as the thermic rise, and at times, in young dogs, until death occurs. Urine passed is rose coloured, deep red or black as coffee dregs; it does not contain red globules, but hæmoglobin (up to 3.5 per cent.). It is rich in urea, contains sugar and glycosuric constituents. Hæmoglobinuria is constant in all cases of acute, grave and quick developing piroplasmosis.

Icterus is another important symptom. It shows itself when temperature falls to near normal or below it; the mucosæ become dark coloured, purple even, and then icteric, and the skin shares in the jaundice. The blood is gravely altered and profoundly modified. It is pale, as if mixed with water, and coagulates slowly, and the clot is paler and softer than normal; the serum is reddish. There is intense anæmia as a result of this pronounced globular destruction. The parasites are found in the enlarged red blood corpuscles, or at liberty in the plasma, and in a proportion variable with the intensity of the infection.

The progress of the malady is rapid. Sick dogs remain lying or move about with staggering gait, get breathless, and lie down; signs of paralysis occur; sensibility is diminished or abolished. Coma appears, and death occurs quietly in three to ten days; occasionally death is heralded by convulsions.

Chronic Form.—Chiefly occurs in adult or aged dogs; characterised by a profound anæmia. At first transient hyperthermia, which may show 104½° F. Then anæmia, pale mucosæ, listlessness, dry skin, staring coat, lack of appetite; sick dogs lie about insensible to their surroundings; they become emaciated and easily breathless.

Hæmoglobinuria is rare; when it occurs it persists for one or two

days ; urine ranges all colours from rose to black-currant colour ; it contains biliary pigment ; icterus is not generally seen in the mucosæ.

The blood is discoloured, pale, and the numeration of globules shows the profound anæmia of the ailing dogs. White globules increase in number, and there is hyperleucocytosis and phagocytosis of the red blood corpuscles by the white. The evolution of chronic piroplasmosis continues three to six weeks, and gradually the dog regains apparent normal health with the disappearance of the named symptoms. But *the clinical cure is not accompanied by microbiological cure*, the organism is not sterilised, and the piroplasms persist in the blood, which, if inoculated into other dogs, causes infection. This survival of the parasite is of long duration, and may last up to 2½ years after the disappearance of all symptoms. Ticks which suck the blood of these anæmic animals can become infective, and this explains the persistence of the malady. Every dog recovered from the harassing symptoms of piroplasmosis becomes a reservoir of virus, whence the ticks procure the parasite. It carries the virus without being inconvenienced, but a febrile attack due to an intercurrent malady may reveal the hæmatozoaries, which multiply actively and reappear in great numbers in the blood.

Lesions.—The skin, conjunctive tissue, mucosa and serosa have a more or less intense yellowish colour. The spleen in the chronic form is hypertrophied ; its volume is tripled or quadrupled. The liver is congested, and has the appearance of cardiac liver ; in certain cases it may appear normal ; parasites are very numerous in it. The bile, abundant, thick and syrupy, distends the gall bladder. The digestive tube is normal, but now and then the mucosa of stomach or duodenum is congested. The kidneys are badly diseased, detachable capsule, cortex engorged with blood, punctiform hæmorrhages, glomerular hæmorrhages obstruct the tubes, the cells of which contain abundant pigment granules. The renal blood contains very numerous parasites ; urine dark coloured, and brownish in the bladder. The lungs scattered with little hæmorrhagic spots ; ecchymoses at the point of the heart and on the endocardium. Clots in the heart soft and full of hæmoglobin.

Lymphatic glands rarely altered, marrow congested, nervous centres normal. Piroplasms destroy the red globules, into which they penetrate. How is the destruction of these globules brought about ? Very likely by the toxin secreted by the parasites.

Diagnosis—Acute Form.—Red or black urine or icterus *a few days after being out on duty*. General *malaise*, and discovery of ticks. Early treatment is very important, and all dogs, after a day's work in woods, thickets, coppices or rough and unknown ground, should be very

carefully examined. The success of veterinary intervention often depends on the vigilance of the dog owners.

Clinical diagnosis is definitely confirmed by microscopic examination of the blood.

Chronic Form.—Diagnosis is difficult, for the symptoms are vague and unprecise. Anæmia gradually increasing, thermic rises, hæmoglobinuria and slight icterus when observable, and presence of ticks on the body are all signs denoting piroplasmosis. Examination of the blood does not give such clear results as in the acute form. Inoculation of the blood of a suspected dog into the peritoneum or vein of a puppy will generally cause the acute form of piroplasmosis if the diagnosis is correct.

Differential Diagnosis.—From simple catarrhal jaundice by an examination of the blood ; absence of hæmoglobinæmia in the urine. From affections of the kidney by absence of icterus and localisation of other ailments by examination of the urinary apparatus. Tuberculosis, ankylostomiasis and pulmonary strongylosis may be differentiated by observation and a knowledge of symptoms peculiar to these maladies, and chiefly by using tuberculin, by parasites in the excrement, and examination of the blood.

Prognosis.—Acute form very frequently fatal. Early intervention is very necessary if the case is to be hopeful. Chronic form is serious, if not exceptionally fatal. Causes a profound anæmia, which means a long convalescence. The seriousness is accentuated by the fact that the parasite persists for several months in the blood of convalescent animals, and these constitute reservoirs of virus for the ticks.

Immunisation.—Animals cured of piroplasmosis are usually immune. Certain cured dogs may be inoculated with success. The virulence of the piroplasm cannot be attenuated, and seropathic investigations have not given practical results. Litters from immunised bitches possess only slight passive immunity, which is not slow to disappear, but which becomes durable if one gets the dog bitten by ticks. Piroplasms do not pass from the mother to the fœtus.

Prophylaxis.—It is illusory, and comprises destruction of ticks on the bodies of the animals.

Treatment.—All other methods give way before the use of trypan blue. This substance, known also as " tolidin blue," is a dark blue powder, little soluble in cold, but more soluble in hot water. *Cooling causes precipitation of the solution,* which gelatinises 24 hours afterwards. One to two per cent. solutions are used intravenously or subcutaneously. The first method is preferred to the second. The irritant local action of the agent often causes abscess formation at the point of injection, but if the solution is injected warm hypoder-

mically there is little fear of this complication. Certain authors advise that the solutions be filtered. It causes blue colouration of the tissues, urine and milk, which disappears in a few days.

Nuttall, Graham Smith and Hadwen have shown that injections of trypan red or trypan blue cause destruction of the parasite. Practised 24 hours after experimental infection the animal does not contract the malady. Walter Jowett, at the Cape, confirmed these results.

The good effects of trypan blue are shown by Meyer (1911), Montgomery (1912), Branford (1912), Sabrazés and Boudeaud (1913), and Naudin (1914).

We have had good results from a first injection of 12 c.c. of a 1 per cent. solution and two days afterwards 10 c.c. The patient was a three months old setter, and at the end of eight days it was convalescent although showing hæmoglobinuria and slight icterus. Blood examination a few days after injection showed a sensible diminution of the number of parasites. Early treatment is recognised as important by all authors, and we think that increased doses at a second injection are beneficial :—

Jowett's table of doses is as follows :—

		2% Solution.
Dogs	9 lbs. weight	3 to 5 c.c
,,	10 lbs. to 20 lbs. weight	4 to 6 c.c.
,,	20 lbs. to 30 lbs. weight	6 to 10 c.c.
,,	30 lbs. to 40 lbs. weight	10 to 15 c.c.
,,	60 lbs. weight	22 c.c.
,,	65 lbs. weight	25 c.c.

Concurrently rational therapy as regards symptoms, sustains the heart, supports the strength of the patient, combats intoxication with saline injections. In the chronic form trypan blue gives excellent results, as declared by Naudin. Arsenical preparations and quinine hastened cure and shortened convalescence. Feeding ought to be strictly supervised and very alible (nutritious and easily assimilable). Trypan blue will not always be successful, because there is a great variability in the virulence of the disease, and this is probably why remedies reputed as infallible in some districts and cases are useless in other places and instances.—*Revue Veterinaire*, November, 1921.

G. M.

Review.

REPORT OF THE VETERINARY DIRECTOR-GENERAL FOR CANADA FOR THE YEAR ENDING MARCH 31, 1921. Published by Department of Agriculture, Canada. Printed by F. A. Acland, Ottawa. Price 5 cents.

IN his interesting annual report, F. Torrance, B.A., D.V.Sc., states that Canadian live stock still retains its remarkable reputation for healthiness. None of the great animal plagues have made their appearance, and the losses from hog cholera and glanders are extremely low.

The mange area of Alberta, as large as that of Scotland, has been cleaned up. This has been effected by the enforcement of a compulsory dipping order for all cattle. New dipping vats were judiciously placed all over the region, and in June and July nearly 200,000 cattle were dipped twice. The result has been that there is now no mange area in Canada for the first time in twenty-six years. The dip used was the lime and sulphur one.

Municipal testing for tuberculosis in cattle is on the increase, and accredited herds are becoming more numerous. The addition of fresh animals to the herds is causing some trouble because of testing before coming on the farm, keeping in isolation for sixty days, and retesting, but relief will be in sight when a list of fully accredited herds, from which purchases can be made, can be furnished. The research station did good work in supplying tuberculin (subcutaneous, intradermal, ophthalmic), mallein, blackleg and abortion vaccines. The meat and canned goods division has been very active in examining both the home supply and that which is imported into the Dominion.

" Canada to-day is the only country in the world which has a law setting out standards for food products to which all countries wishing to engage in trade with her in these products must conform."

G.M.

THE LEUCOSIS OF FOWLS AND LEUCEMIA PROBLEMS. By Vilhelm Ellerman, M.D. Published by Gyldendal. Price 7s. 6d. net.

THE quotation from the preface which is printed on the paper cover of this volume states that this book has for its object the spread of knowledge of leucosis in fowls, and the furtherance of research. The conception of a book in this spirit alone makes it worthy of attention, but this work has greater claims for perusal than that. It begins with a most fair-minded and broad exposition of the history of the theories of blood diseases in general, and then proceeds to recount the special researches of the author in leucosis in fowls. The theory of infection as the cause of this disease is certainly supported by the work of the author, but on his own showing it is doubtful whether any safe analogy can be drawn between the disease in fowls and that in man. The author dwells on the difference of predisposition of individuals and on the different susceptibility of the organs liable to be affected. It would be interesting to know whether any work had been done on fowls of definite stocks, so as to ascertain whether birds descended from one pair of fowls were more susceptible to the disease

in general or to one special form of it than those descended from another pair. The author has conscientiously done his best to avoid further complication of the already complicated terminology of the hæmatologists, and has succeeded fairly well. The English in which the book is written is curiously uneven; generally it is good, but occasionally there are marked lapses into foreign idiom. This is most marked in the descriptions of technique. Nowhere, however, is it such that the meaning is obscured. To sum up—this book should be of the greatest interest to all comparative pathologists, whether they view it from the medical or veterinary standpoint. N.L.

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